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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,994	10/30/2003	Matthew T. Currie	ASC-063	7878

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EXAMINER

BREWSTER, WILLIAM M

ART UNIT PAPER NUMBER

2823

DATE MAILED: 05/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/696,994	Applicant(s) CURRIE ET AL.	
	Examiner William M. Brewster	Art Unit 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2005.
 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
 4a) Of the above claim(s) 27-50 is/are withdrawn from consideration.
 5) ☐ Claim(s) _____ is/are allowed.
 6) ☒ Claim(s) 1-26 is/are rejected.
 7) ☐ Claim(s) _____ is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>011005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Claims 27-50 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 10 March 2005.

Applicant's election with traverse of Species V, reading on claims 1-26, in the reply filed on 10 March 2005 is acknowledged. The traversal is on the ground(s) that searching for the elected species would yield prior art or lack thereof for the non-elected species. With respect, this is not found persuasive because as the figures, specifications, and claims indicate the method of forming the non-elected species would constitute different searching in the classification schedule and text searching for the added and different features.

The requirement is still deemed proper and is therefore made FINAL.

Drawings

~~The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5)~~
because they do not include the following reference sign(s) mentioned in the description: in figs. 2A and 2B, the layers between 102 and 550 should be labeled, and if not already, included a description in the drawings. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid

abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 11-17, 19, 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Chu et al., US Publication No. 2002/0171077 A1.

~~Chu anticipates a method for forming a semiconductor structure, the method~~
comprising: in fig. 13, forming a strained semiconductor layer 122 or 124 over a substrate 1; and depositing a screening layer 127 over at least a portion of a top surface of the strained semiconductor layer, p. 6, ¶ 52;

Art Unit: 2823

limitations from claim 2, the method of claim 1, in fig. 4A, wherein the substrate comprises at least one of silicon and germanium: silicon p. 3, ¶ 34;

limitations from claim 3, the method of claim 1, in fig. 13, wherein the strained semiconductor layer 122 is tensilely strained, p. 6, ¶ 52;

limitations from claim 4, the method of claim 3, wherein the strained semiconductor layer comprises tensilely strained silicon 122 or tensilely strained silicon-germanium alloy, silicon, p. 6, ¶ 52;

limitations from claim 5, the method of claim 1 wherein the strained semiconductor layer is compressively strained 124, p. 6, ¶ 52;

limitations from claim 6, the method of claim 5 wherein the strained semiconductor layer 124 comprises compressively strained germanium or compressively strained silicon-germanium alloy: silicon-germanium alloy, p. 6, ¶ 52;

limitations from claim 10, the method of claim 7, in fig. 13, wherein the thickness of die strained semiconductor is substantially unchanged following the deposition of the screening layer, do to deposition of the screening layer, p. 6, ¶ 52;

limitations from claim 11, the method of claim 1, in fig. 7A wherein the substrate comprises an insulating layer 72 disposed underneath the strained semiconductor layer, p. 5, ¶ 44;

limitations from claim 12, the method of claim 1, in fig. 13, wherein the substrate comprises a relaxed semiconductor layer 121 disposed underneath the strained semiconductor layer, p. 6, ¶ 52;

Art Unit: 2823

limitations from claim 13, the method of claim 12, in fig. 13 wherein the substrate further comprises a compositionally graded layer 2 disposed underneath the relaxed semiconductor layer 121, p. 6, ¶ 52;

limitations from claim 14, the method of claim 13 wherein the graded layer comprises at least one of a group II, a group III, a group IV, a group V, and a group VI element, group IV, Si and Ge, p. 6, ¶ 52;

limitations from claim 15, the method of claim 14, wherein the graded layer comprises at least one of silicon and germanium: both Si and Ge, p. 6, ¶ 52;

limitations from claim 16, the method of claim 15 wherein the graded layer 2 is graded to a concentration of greater than about 10% germanium, wherein $y = 0.1$ to 0.9 , or 10% to 90% , p. 6, ¶ 52;

limitations from claim 17, the method of claim 13 wherein the thickness of the graded layer 2 ranges from about $0.5\ \mu\text{m}$ to about $10.0\ \mu\text{m}$: $0.25\ \mu\text{m}$ to about $10\ \mu\text{m}$ thick, p. 3, ¶ 34;

limitations from claim 19, the method of claim 1 wherein the screening layer, upper portion of 127 comprises an oxide layer, p. 6, ¶ 51;

limitations from claim 22, the method of claim 1, further comprising: introducing dopants into the semiconductor structure, wherein the screening layer affects the introduction of dopants into at least a portion of the structure by at least one of scattering dopants and reducing energy of the dopants, forming part of the masking for the implantation of 129 and 130, p. 6, ¶ 52;

limitations from claim 23, the method of Claim 22, further comprising wherein the screening layer, upper portion of 127 hinders out-diffusion of the dopants from at least a portion of the substrate: any additional layer hinders diffusion;

limitations from claim 24, the method of claim 1, further comprising, prior to depositing a screening layer, growing an oxide layer, lower portion of 127 over the portion of the top surface of the strained semiconductor layer, p. 6, ¶ 52;

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7-10, 18, 20, 21, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu as applied to claims 1-6, 11-17, 19, 22 above, and further in view of Wolf V. I, pp. 182-3, 307-308.

Chu does not specify the method of deposition of the screening layer, but Wolf does. Wolf on bottom of p. 182 to mid p. 183 describes and gives motivation for the chemical vapor deposition of silicon oxide layers. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Wolf's process with Chu's invention would have been beneficial because it forms oxide of uniform thickness and composition.

Chu does not specify using an anneal, but Wolf does. Wolf, in section e) *Diffusion of Implanted Impurities*, pp. 307-8 describes and gives motivation the method of Claim 22, further comprising, subjecting the structure to a thermal anneal. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Wolf's process with Chu's invention would have been beneficial because it activates implanted layers in short times with limited diffusion.

Claims 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu as applied to claims 1-6, 11-17, 19, 22 above, and further in view of Bhattacharjee et al., US Patent No. 4,764,248.

Chu does not specify using rapid thermal oxidation (RTO), but Bhattacharjee does. Bhattacharjee teaches and gives motivation in col. 8, lines 3-35, wherein in fig. 3A, the method of claim 24 wherein the oxide layer 22 is grown by rapid thermal oxidation. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Bhattacharjee's process with Chu's invention would have been beneficial because it ensures controllability and short thermal time of the formation of the oxide.

For claims 7-9, neither Chu nor Bhattacharjee specify the strained layer thickness, for claim 21, the thickness of the screening layers, or for claim 26, the thickness of the oxide layer, however the practitioner may optimize this dimension.

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art . . . such ranges are termed 'critical ranges' and the applicant has the burden of proving such criticality . . . More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ 233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmischer 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Other Prior Art

Applicant must state for the record that the following prior art was commonly assigned at the EFD of the current application or face rejection based on it: Vinels, US Publication No. 2004/0040493; Lochtefeld, US Publication No. 2004/0031979; Lochtefeld, US Patent No. 6,838,728; Currie, US Patent No. 6,831,292; Hammond et al., US Patent No. 6,680,496.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 571-272-1854. The examiner can normally be reached on Full Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

William M. Brewster

3 May 2005
WB